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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF MARKETS

RADIO MARKET NEWS SERVICE

Radio Information Circular
No. 1.

This circular of information relative to the transmission and reception of broadcast radio market news has been prepared by the Bureau of Standards of the Department of Commerce and the Bureau of Markets of the Department of Agriculture, for the use of those who are not specialists on radio communication but who wish to make use of it in the reception of market reports.

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WASHINGTON, D. C.
June 15, 1921.

Radio Information Circular.
No. 1.

Introduction.

The radio market news service of the U. S. Bureau of Markets represents an effort on the part of the bureau to make its market news more immediately available and more effective than it can be made in any other way. Ever since the inauguration of the first market news service on fruits and vegetables in May, 1915, the specialists of the bureau have given continuous study to the problem of supplying market news on agricultural commodities to those who may have use for such information as quickly as possible after it can be obtained. The market news services of the bureau cover live stock and meats; dairy and poultry products; fruits and vegetables; hay, feed and seeds, and some other commodities associated with these four general groups. The information is supplied to and is utilized by producers, shippers, dealers, brokers and commission men, manufacturers, warehousemen, demonstration and extension workers, banks, transportation agencies, chambers of commerce, buying and selling organizations, and other commercial, extension and educational agencies.

It is the function of the Bureau of Markets to gather or assemble market information from all kinds of reliable sources and distribute it in such a way as to make it available to the greatest possible number who wish to use it. In performing this function it utilizes and cooperates with all agencies possible. It affiliates with State agencies which may or may not have similar functions with respect to the State as the U. S. Bureau of Markets has to the Federal Government. It utilizes the railroads for information relative to shipments and movements. In one way or another, it assembles information from every available source where such information can be obtained.

Broadcasting by Radio.

In utilizing radio communication as a means of disseminating market information, the Bureau of Markets is taking advantage of one of the agencies which has certain possibilities possessed by none that has been used in the past. This new method makes it possible for all who wish this information to help themselves to it, if they will but equip themselves to receive it in the form in which it is sent. The advantages of broadcasting information by radio are (1) that the information can be intercepted or copied by means of suitable equipment at any point within certain approximate limits whether or not such point is connected by railroad, telegraph or any other of the ordinary means of communication and (2) that the transmission of the news is instantaneous. These two factors in radio communication make it possible for any one whether he is located in a congested city or in the country a hundred miles from the railroad or telegraph wire to receive the information with equal dispatch. Radio transmission can be effected either by the international telegraph code, using dots and dashes, or by radio telephone. The radio telephone will probably present the most good to the greatest number.

Utilization of Radio Market Reports.

Radio market reports sent out broadcast can be received by any agency. In general, they are being utilized by State bureaus of markets in giving them the national market reports which they may combine with local market information and distribute in other ways throughout the State, by county farm organizations or other local agricultural agencies which act as centers of information for the county or locality, and by banks, shipping associations, commercial exchanges, commercial clubs, newspapers, all of which may serve as agencies for secondary distribution of the reports. In addition, the reports may be received direct by farmers, country elevators, dealers, shippers, and many others who will use the information in the transaction of their business. The extent to which this latter class will receive market reports direct remains to be seen. It is certain, however, that the State and county radio receiving stations will be developed rapidly because of the economical reception and distribution of market reports through them. Certain individuals or a small group of individuals may find it advantageous to solicit the aid of the radio amateurs in the community. This should be arranged for very carefully to insure that the amateur is capable of receiving a true copy of the reports as transmitted.

History of the Radio Market News Service.

Since the radio market news service was experimentally begun by the U. S. Bureau of Markets, on Dec. 15, 1920, it has developed very rapidly so that, at the present time, the National market news is not only being distributed by the U. S. Bureau of Markets but other agencies are extending the distribution of the National market reports as well as local market reports. The service was started on Dec. 15 by the Bureau of Markets at Washington. One report was sent out at 5:00 p.m. each day from that station. This was continued for four months to determine the practicability of the method. When it became apparent that this method would not only be practical but also more economical and efficient for certain kinds of distribution than any other agency, the Bureau of Markets took up the matter with the Post Office Department and accepted their offer to utilize the radio stations of the Air Mail Radio Service in the dissemination of market reports. At the present time the larger part of the radio market news service of the bureau is handled through the Post Office radio stations, though in an experimental way a few privately owned radio telephone stations are being used for local distribution of market reports. The Air Mail Radio Service of the Post Office Department was established primarily to give communication between the flying fields, in connection with the transportation of mail by airplanes. These stations have to be available for service a large part of the day but have considerable time which is not necessarily occupied in the business of the air mail service. It is proposed to make the best possible use of such stations by adapting certain market news schedules to the unoccupied time. This incurs merely a nominal additional expense to the Post Office Department and inasmuch as the market information is obtained for other uses by the U. S. Bureau of Markets the service as constituted at present incurs practically no additional expense to this bureau. Because of the necessity of using stations not intended primarily for broadcast transmission but rather for interstation traffic it is not possible to organize as effective and complete a service as could be furnished by a chain of stations equipped solely for radio broadcast transmission. It is thought desirable, however, to take advantage of every facility available in order to obtain experience in handling market news by this method and be ready to install a more effective service should special facilities be made available at a later date.

Forms of Reports.

Certain types of market information can be put into a form for rapid transmission by use of standard forms and code letters. This does not involve the ordinary use of code words and the necessity of coding and decoding the messages received but it does make necessary the sending and receiving of the reports on special forms. Inasmuch as the sender and the receiver use identical forms, it is possible by the use of code letters preceding each blank space in which information is to be copied to transmit rapidly a large amount of information prepared in standardized form. By the use of such special forms and regular transmitting schedules a very effective service can be developed. This field has only been touched upon and great improvements undoubtedly will be developed in the handling of information in this way.

The receiving of reports by telegraph codes, using dots and dashes, makes it necessary that receiving operators understand the international (continental) code and be able to copy at least 15 words a minute. Wherever radio telephone communication is established, it is necessary only that the operator be able to adjust the radio receiving equipment properly, since the telephone reports are reproduced in the radio receiving equipment just as they would be in a wall or desk telephone. Wherever it is desired to utilize the reports sent by radio telephone, for publication or further distribution, they can be received and copied by a stenographer. At the present time only a few special forms of reports have been developed for use in radio broadcast communication. Others will be developed from time to time as the service grows and modifications of the present forms undoubtedly will be made.

In the forms of reports already in use, two-letter code symbols ~~are used~~ to designate the information sent. These are used in two different ways: (1) A two-letter symbol is placed at the beginning of the blank space which is to contain a certain type of information. The operator simply sends the two code letters and the information occupying the blank space. For example, in sending "New Jersey sacked Irish Cobbler potatoes per 100 lbs. in consuming markets, New York (SR), $1.75-2,10," the operator would send only "(SR) $1.75-2.10." (2) Code letters are also used to designate certain options or alternatives to indicate types of information. For example, "Offering of wheat at country points, heavy (DK)____, fair (DL)____, light (DM)____". The operator would send (DK), (DL) or (DM), as indicating one of the three alternatives and the receiving operator would put a check mark in the blank space following the letters received. Fractions are avoided wherever possible, but when necessary are sent as follows:

$1.50 is sent as 1R50
$1.50-1/2 is sent as 1R50 and 1 DN 2.
7/8 of 1 cent is sent as 7 DN 8 cents.
65-7/8 cents is sent as 65 and 7 DN 8 cents.

Cooperation with States.

A number of States, through State bureaus of markets and State extension departments, are cooperating with the Federal Bureau of Markets in organizing their States to receive and utilize radio market reports. In some cases they are considering the establishment of regular information centers which may serve as distribution points for sending out the information through other channels. In other cases progressive agricultural counties are considering the installation of receiving equipment in connection with farmers' organizations so that the information will be available to the county agent for further extension either through the daily newspapers, telephone exchanges, or other agencies. Until radiophone transmission is available for general use it is probable that the larger application of the radio service will be through organizations or institutions which will obtain operators and equipment to receive the reports and distribute them or make them available to a large number. When the radiophone comes into general use many of those engaged in producing or marketing farm products will undoubtedly obtain equipment to receive the reports directly as no specially trained operator will be necessary.

Several States have considered the matter of installing radiophone equipment so that the reports received in code may be retransmitted by radiophone and thus have a much greater distribution. It is recommended that the national service as furnished by the U. S. Bureau of Markets through the Post Office stations be developed somewhat further before serious consideration be given to installation of radiophone equipment by the States. As a matter of fact there may be some difficulties encountered at present which would make it impossible to obtain the type of radiophone equipment that might be most desirable for this purpose.

The Transmitting Station.

Wave Length. There are many technical problems in connection with radio telegraphy and radio telephony that have to be considered in the dissemination of broadcast reports. The questions of wave length and kind of transmission are both very important. Although the amateurs are restricted to the use of 200 meters or less for transmission, a large percentage of them are equipped to receive messages over a much wider range of wave lengths. Questionnaires sent to a limited number of amateurs having radio transmitting sets show that about 50% are now equipped to receive messages transmitted on wave lengths between 150 and 3000 meters. At first thought it would seem best to have the market reports transmitted on a short wave, but the lower wave lengths lack carrying power. The shorter waves have additional objections owing to interference. Since amateurs are licensed to transmit on the shorter waves, it would be very difficult for the one receiving the market news to get solid copy (a complete and accurate copy of the message as sent) if several nearby amateurs were transmitting at the time the Post Office station was transmitting. Because of the greater transmitting range and less interference, wave lengths of 2500, 3000 and 4000 meters are being used principally at the present time.

Type of Transmitting Set. The stations from which the market reports are now being sent by radio, the types of transmitting sets, the wave lengths used, and the times at which the several reports are sent are given in the transmitting schedule.

The arc stations used have a greater transmitting range than the spark station. Furthermore, it should be borne in mind that the spark station transmits damped waves and the arc stations transmit undamped or continuous waves. This information is necessary for the selection of the proper receiving sets.

Inasmuch as the service is going through a period of rapid development and the number of stations sending the reports is rapidly changing, anyone desiring up-to-date information as to the extent of the service should communicate directly with the Division of Market Information, U. S. Bureau of Markets, Washington, D. C.

Radio Telegraph vs. Radio Telephone Transmission.

The subject of radio telegraph (code) and radio telephone transmission has been touched upon above. All things being equal and in readiness, radio telephone transmission would be the logical method to use. Just at present, it might be quite difficult to purchase reliable, high-powered radio telephone equipment on the commercial market. Furthermore, if the Bureau of Markets had waited until the high-powered telephone transmitter had become commercially available it would not have made the six months of gratifying history which the service now has. After the broadcasting of market news by radio telegraph was shown to be practicable it was decided to use the radio transmitting stations of the Air Mail Service which were already installed and in operation. This forms the first chain of information-disseminating radio stations without the delay and cost of constructing new ones. It is to be expected that these and other like ones will remain the master stations for some time.

Furthermore, if the Bureau of Markets is successful in its work of getting the various State, County, and private organizations to equip themselves to receive the radio telegraph (code) market reports, great advancement will have been made, for those stations will be ready to receive the radio telephone reports when that system can be adopted. In other words, a radio receiving station that will pick up the telegraph messages from the ether will, without any alteration, pick up the radio telephone messages.

The Radio Receiving Set.

Type of Receiving Set. It will doubtless be difficult for the non-technical person to choose the best type of receiving equipment for his specific needs. He will find so much radio equipment advertised that his first tendency will be to turn to someone for information. Some Government bureau is the logical place to inquire for unbiased opinions. The Bureau of Markets has asked the Bureau of Standards to furnish the technical information on radio receiving equipment. The Bureau of Standards is now gathering information regarding radio receiving sets which are commercially available and are making certain performance tests on many of them. The information gained in this way will be turned over to the Bureau of Markets for general distribution and to assist them in answering inquiries from those who wish to avail themselves of the broadcast news. There will probably be a limited number of types of sets needed to meet the general requirements.

Radio receiving sets are of two general classes: (1) those suitable for receiving signals from sets which transmit damped waves, modulated waves or radio telephony, and (2) those suitable for receiving signals from the above types of sets and also from stations which transmit unmodulated or continuous waves. Damped waves are emitted by spark transmitting sets. Most of the stations which are used for transmitting market reports are arc stations, and it is likely that the few spark stations will soon be replaced by arc stations, which transmit continuous waves.

A receiving set of the first class referred to above may be a very simple set equipped with a crystal detector. However, such a set is relatively insensitive and can only be used for receiving over moderate distances. Most receiving sets of the second type referred to above use an electron tube detector to which may be connected an amplifier of one or more stages. The crystal detector is suitable for receiving radio telephone signals at points nearby the transmitting station. However, in view of the fact that the transmission of market reports by radio will, for the immediate future, be mostly by continuous-wave radio telegraph, it is recommended that those who are providing themselves with receiving apparatus for this service should secure electron tube sets for receiving undamped signals rather than crystal detector sets which are unsuitable for receiving such signals.

It has been stated that the wave length range adopted by the Bureau of Markets will probably be above the range of the average amateur receiving set. This does not necessarily mean that the amateurs will have to discard their present sets if they wish to avail themselves of the market news. The majority of these sets can be easily adapted to receive messages at the longer waves by such means as the addition of loading coils or by rewinding some of the coils in the sets. High-school or college teachers of physics or electrical engineering can frequently give assistance regarding this point and others relating to the receiving equipment.

If one plans in advance, it is not essentially more difficult or expensive to obtain equipment that will receive at the longer wave lengths than at the shorter ones. It is recommended that anyone purchasing equipment for the reception of broadcast radio reports bear in mind the desirability of having equipment that can be modified or adapted to a wide range of wave lengths, at least those ranging from 2500 to 5000 meters. Many matters such as the wave length for ultimate use have not been finally determined. In fact, it probably will be necessary to obtain a definite reservation of certain wave lengths for the dissemination of broadcast market reports in order to avoid interferences from any other source, but this is in turn dependent upon the report of the forthcoming International Radio Conference.

In purchasing apparatus for the reception of radio market news from a given transmitting station, one should state the wave length range which it is desired to cover, name of and the distance from the transmitting station.

Cost of Receiving Sets. Any attempt to give the cost of commercial radio receiving sets is attended with difficulties. Some sets may be designed in which dependability is the sole criterion, while others may embody fine appearance with dependability. The showy, unreliable sets are not to be considered here no matter what the cost, for service is of prime importance.

Reliable radio receiving equipment such as is now on the market or which may be especially built for market news reception will probably cost between $75 and $250. These prices cover the range of sets from a simple electron tube detector set to the more complex receiving set complete with detector and three-stage amplifier panels, storage battery, dry batteries, telephone receiver, electron tubes, and possibly some simple antenna equipment.

The Bureau of Standards expects soon to be in a position to give information on the cost of receiving apparatus and names of manufacturers from which it can be purchased. There is in preparation a list of manufacturers of radio receiving equipment. This list includes manufacturers of built-up receiving sets as well as separate radio parts with which one can assemble a receiving set.

Factors Governing Reception.

The Bureau of Markets is undertaking to establish on an efficient basis the radio market news service. There undoubtedly are many obstacles in the way of making it an immediate, complete success but so far as these have been considered up to the present time, they are not insurmountable and it is thought that with the cooperation of State and local agencies and suggestions from radio operators located over the country who are trying to receive the reports, it may well be that the Bureau of Markets will be able in a very short time to put the service on an entirely practical, substantial basis. At the present time it is entirely dependent upon the cooperation of the Post Office Department in the dissemination of the reports and they are giving their heartiest assistance to the Bureau of Markets in this work. It will be some time before receiving stations will be distributed all over the country, receiving the reports regularly. A great many of the licensed amateur operators are receiving the reports and many of them are fully competent to do this. However, it can not be considered as on a permanent basis until the State and county agencies have made provision for equipment and regular operators to receive the reports regularly. These are all controllable factors. The apparently uncontrollable factor which must be given consideration is the one of natural conditions, such as weather, strays and dust storms. These will be real obstacles which in some localities and in some seasons will be found worse than in others. During midsummer, radio reception during daylight hours may be frequently interrupted. In fact, it may be impossible to receive the reports at times.

It will not be necessary, for our immediate needs, to discuss the probable reasons for these peculiar atmospheric conditions which interfere with radio reception. It is a fact, however, that frequently during the summer months, the strays may completely drown out the radio signals picked up by the receiving set. The idea that higher amplification will relieve the situation is erroneous. The amplifier usually amplifies the strays along with the incoming signal, so the amplified signal is often less intelligible than the signal received on a simple detector. The use of high-power transmitting stations is an advantage in this respect.

During storms it sometimes is not only impossible to receive any messages, but it may be unwise, especially if the storm is accompanied by lightning discharges. At such times the antenna should be grounded to protect the apparatus and no attempt made to receive radio messages. Although dust storms are not generally prevalent, they are to be reckoned with. Occasionally the transmitting range of a station will be limited in a certain direction owing to an intercepting dust storm. There are yet other difficulties, such as fading of signals, which must be encountered, but some of these are avoided by using the long waves. However, after taking all of these things into consideration it is probable that a high percentage of completeness may be anticipated in handling this kind of service.

Sources of Information.

There are given below references to sources of information on radio for those not already conversant with the subject. This material has been compiled by the Bureau of Standards. It should not be considered complete, for additional sources are continually becoming available and the list is therefore subject to revision at all times. It does, however, point out valuable and necessary information to those who are interested in operating radio stations.

Periodicals. Persons interested in the more elementary phases of radio communication can keep in touch with radio developments which will be of interest to them by arranging to see regularly the issues of one or more of the following periodicals:

Q.S.T. Published by the American Radio Relay League,
  Hartford, Conn.
Radio News, 235 Fulton St., New York.
Wireless Age, 326 Broadway, New York.
Pacific Radio News, 50 Main St., San Francisco, Calif.
Wireless World, 12 Henrietta St., London, England.

Persons who have had technical training in electricity and radio communication will be interested in the "Proceedings of the Institute of Radio Engineers," 140th St. and Convent Ave., New York City, and the "Radio Review," 12 Henrietta St., Strand, W. C. 2, London, England.

Persons in the vicinity of Chicago will be interested in "Radio Topics" published at 4533 North Sawyer Ave., Chicago. Persons in Maryland, Virginia, and adjacent states, will be interested in the "Radio Condenser," published at 3909 Cottage Avenue, Baltimore, Md.

Books. The Superintendent of Documents, Government Printing Office, Washington, D. C., will send without charge, on request, a copy of his "Price List No. 64," which lists Government publications of radio interest. The Bureau of Standards issues a list of publications of the Bureau of Standards which are of technical interest; a copy of this list may be secured by addressing the Radio Laboratory, Bureau of Standards, Washington, D. C.

The Bureau of Standards has prepared an elementary book treating of the principles of radio communication, entitled "The Principles Underlying Radio Communication." Copies of this book may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., after November, 1921.

The following are other elementary radio books which will be found useful:

E. E. Bucher, Practical Wireless Telegraphy.
New York, 1918, Wireless Press, Inc.

Rupert Stanley, Textbook of Wireless Telegraphy (2 volumes)
London and New York, 1919, Longmans Green & Co.

Charles B. Hayward. How to Become a Wireless Operator.
Chicago, 1918, American Technical Society.

P. E. Edelman. Experimental Wireless Stations.
New York, 1920, Norman W. Henley Publishing Co.

M. B. Sleeper. Design Data for Radio Transmitters and Receivers.
New York, 1920, Norman W. Henley Publishing Co.

E. E. Bucher, Wireless Experimenters Manual.
New York, 1920, Wireless Press, Inc.

A. N. Goldsmith. Radio Telephony.
New York, 1918, Wireless Press, Inc.

Robison's Manual of Radio Telegraphy and Telephony.
Annapolis, Md., 1920, United States Naval Institute.

G. D. Robinson. Modern Theory and Practice in Radio Communication. Annapolis, Md., 1920, United States Naval Institute.

E. W. Stone. Elements of Radio Telegraphy. New York, 1919, D. Van Nostrand Co.

J. C. Hawkhead and H. M. Dowsett. Handbook of Technical Instruction for Wireless Telegraphists. London, 1918. Wireless Press, Limited.

H. M. Dowsett. Wireless Telegraphy and Telephony, London, 1918. Wireless Press, Limited.

The Admiralty Manual of Wireless Telegraphy. London, 1920. Published by His Majesty's Stationery Office.

A valuable reference book on matters of radio interest is the "Year Book of Wireless Telegraphy," published in May of each year by the Wireless Press Limited, 12 Henrietta St., London, England.

The International Morse (Continental) code is given in the Government publication "Radio Communication Laws of the United States" mentioned below and also on a small card (Form 773A) obtainable from the Department of Commerce, Bureau of Navigation or from the District Radio inspectors.

Laws and Regulations. The laws of the United States require that every radio station used for transmitting signals must have a station license. These licenses are issued by the Bureau of Navigation of the Department of Commerce, Washington, D. C. The United States is divided into nine radio districts. Each district has a Radio Inspector, whose address is given below:

1st District, Radio Inspector, Custom House, Boston, Mass.
2d " " " " " New York, N.Y.
3d " " " " " Baltimore, Md.
4th " " " " " Baltimore, Md.
5th " " " " " New Orleans, La.
6th " " " " " San Francisco, Cal.
7th " " " 2301 L.C. Smith Bldg., Seattle, Wash.
8th " " " Federal Bldg., Detroit, Mich.
9th " " " Federal Bldg., Chicago, Ill.

Requests for application forms for licenses, or for information concerning licenses, should be addressed to the Radio Inspector of the district in which the station is located, or, if this is not known, to the Bureau of Navigation, Department of Commerce, Washington, D. C. A station which is used for receiving only, and does no transmitting, does not require a station license. The operator of a station used for transmitting purposes must have an operator's license, in addition to having a station license.

Every person engaged in any form of radio communication should have a copy of a pamphlet, "Radio Communication Laws of the United States," which can be secured by sending fifteen cents (not in stamps) to the Superintendent of Documents, Government Printing Office, Washington, D. C.

Canadian Radio Laws. The laws regulating the operation of private radio stations in Canada are different in several respects from those in force in the United States. For instance, a station which is used only for receiving must have a station license. For authoritative information, inquiry should be made of the Deputy Minister of the Naval Service, Ottawa, Ontario.

Lists of Radio Calls. Every radio amateur should have a copy of each of the pamphlets "Amateur Radio Stations of the United States," and "Commercial and Government Radio Stations of the United States." The price of each of the pamphlets is fifteen cents, and orders should be sent to the Superintendent of Documents. These pamphlets contain lists of the amateur, and commercial and Government stations in the United States, and of the call letters assigned to the stations; a new edition of each pamphlet is published on June 30 of each year. A monthly publication called the "Radio Service Bulletin" is issued which contains information regarding changes in the radio regulations and traffic information, and notes, additions to or other changes in the list of "Commercial and Government Radio Stations." Copies of the "Radio Service Bulletin" may be secured from the Superintendent of Documents for five cents per each issue, or subscriptions may be ordered for 25 cents per year.

A "Consolidated Radio Call Book" is published by the Consolidated Radio Call Book Co., 41 Park Row, New York, N. Y. This gives the calls of both United States and foreign stations.

A list of commercial and government stations operating in the United States and in foreign countries is given in the "Year Book of Wireless Telegraphy," mentioned above.

U. S. DEPARTMENT OF AGRICULTURE
Bureau of Markets and Crop Estimates

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Radio Information Circular
No. 1 (Revised)

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WASHINGTON, D. C.
April 15,1922.

U. S. DEPARTMENT OF AGRICULTURE
Bureau of Markets and Crop Estimates

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No. 1, (Revised)

Introduction.

The radio market news service of the Federal Bureau of Markets and Crop Estimates is an effort on the part of the Bureau to make its market news more immediately available and more effective than it can be made in any other way. Ever since the inauguration of the first market news service on fruits and vegetables in May, 1915, the specialists of the Bureau have given continuous study to the problem of supplying market news on agricultural commodities to those who may have use for such information as quickly as possible after it can be obtained. The market news services of the Bureau cover live stock and meats; dairy and poultry products; fruits and vegetables; hay, feed and seeds, and some other commodities associated with these four general groups. The information is supplied to and is utilized by producers, shippers, dealers, brokers and commission men, manufacturers, warehousemen, demonstration and extension workers, banks, transportation agencies, chambers of commerce, buying and selling organizations, and other commercial, extension and educational agencies.

It is the function of the Bureau to gather or assemble market information from reliable sources and distribute it in such a way as to make it available to the greatest possible number who wish to use it. In performing this function it utilizes and cooperates with all agencies possible. It affiliates with State agencies which may or may not have similar functions with respect to the State as the Federal Bureau of Markets and Crop Estimates has to the Federal Government. It utilizes the railroads for information relative to shipments and movements. In one way or another, it assembles information from every available source where such information can be obtained.

Broadcasting by Radio.

In utilizing radio communication as a means of disseminating crop and market information, the Bureau of Markets and Crop Estimates is taking advantage of one of the agencies which has certain possibilities possessed by none that has been used in the past. This new method makes it possible for all who wish this information to help themselves to it, if they will but equip themselves to receive it in the form in which it is sent. The advantages of broadcasting information by radio are (1) that the information can be intercepted or copied by means of suitable equipment at any point within certain approximate limits whether or not such point is connected by railroad, telegraph or any other of the ordinary means of communication and (2) that the transmission of the news is instantaneous.

These two factors in radio communication make it possible for any one whether he is located in a congested city or in the country a hundred miles from the railroad or telegraph wire to receive the information with equal dispatch. Radio transmission can be effected either by the international telegraph code, using dots and dashes, or by radio telephone. The radio telephone has the greater possible range of usefulness and will probably become almost as widely used as the ordinary telephone or the phonograph.

Radio Reception of Crop and Market Reports.

Crop and market reports sent out broadcast by radio can be received by any agency having suitable equipment. With the development of broadcasting by radiophone there has developed a demand for receiving equipment from many sources. Not much greater technical knowledge is required to receive the reports by radiophone than to use an ordinary telephone.

The broadcasted reports are being utilized by various marketing agencies and agricultural organizations in giving to farmers national crop and market reports which are often combined with local market information. These agencies and associations act as centers for information for the county or locality and include farm bureaus, banks, shipping associations, commercial exchanges, chambers of commerce and newspapers. In addition to these agencies the reports are being received direct by farmers, country elevators, dealers, shippers and many others who use the information in the conduct of their business. In some instances it may be to the advantage of the community or to individuals or an organization to enlist the aid of a local radio amateur to get the news and the weather, crop and market reports.

Stages of Development of the Radio Market News Service.

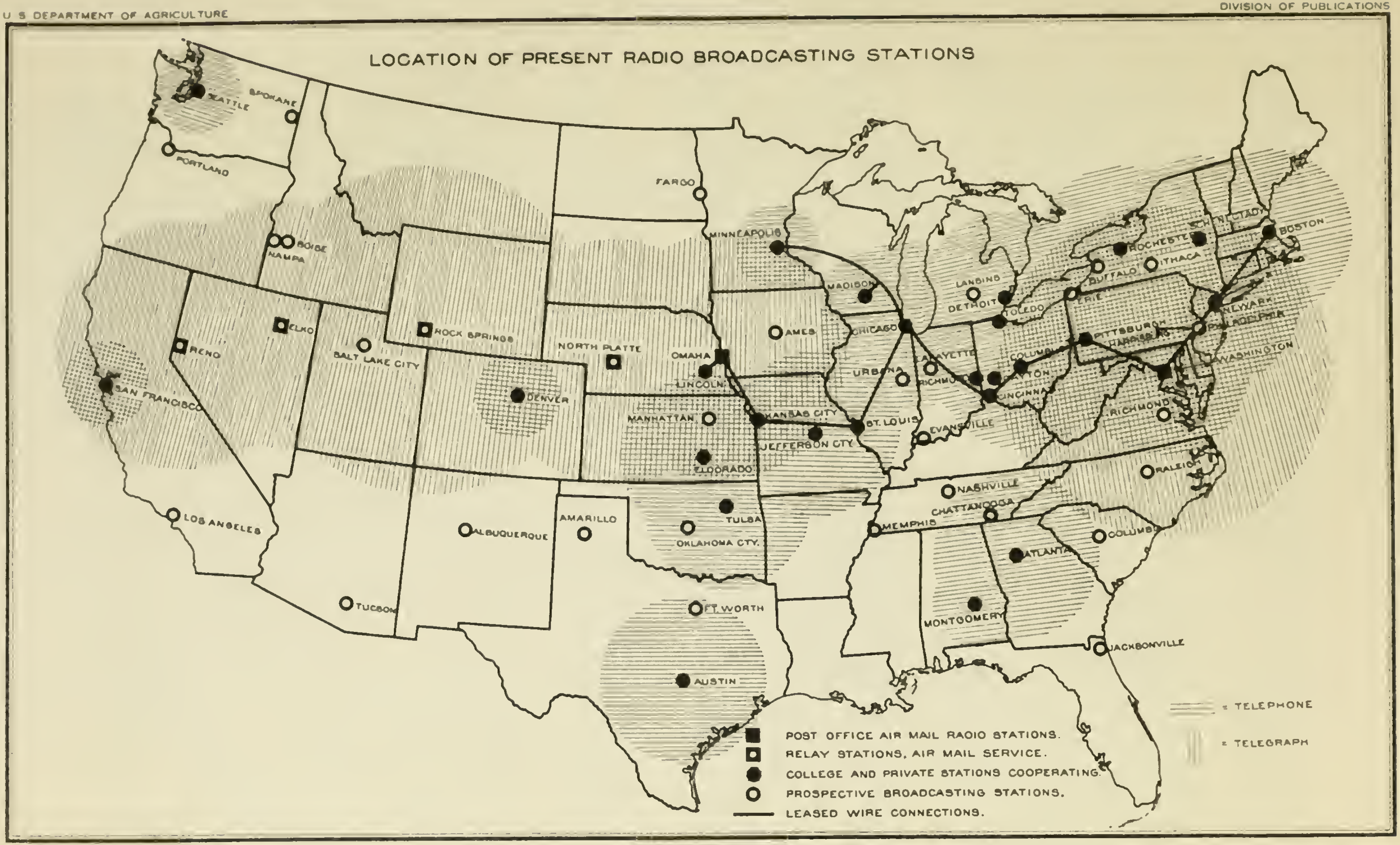
Since the radio market news service was begun experimentally by the Federal Bureau of Markets, on Dec. 15, 1920, it has developed very rapidly so that, at the present time, the national market news is not only being distributed by the Bureau but other agencies are extending the distribution of the national crop and market reports as well as local market reports. The service was begun in December, 1920, at Washington. One report was sent out at 5:00 p.m. each day from the station of the Bureau of Standards through the cooperation of the U. S. Department of Commerce. This was continued for four months to determine the practicability of the method. When it became apparent that this method would not only be practical but also more economical and efficient for certain kinds of distribution than any other agency, the Bureau of Markets accepted the offer of the Post Office Department to utilize the radio stations of the Air Mail Radio Service in the dissemination of crop and market reports.

At the present time the Air Mail Radio Service is broadcasting the crop and market reports from six of its stations. Of these six stations, two of them, Washington, D. C., and Omaha, Neb., secure their information

U S DEPARTMENT OF AGRICULTURE

DIVISION OF PUBLICATIONS

LOCATION OF PRESENT RADIO BROADCASTING STATIONS



January 1, 1918

OUTLINE MAP OF THE UNITED STATES

directly from the Bureau of Markets and Crop Estimates Offices. The others extending at about 350 mile intervals west from Omaha to the Pacific Coast act as relay stations for the Omaha reports.

Many of the universities and agricultural colleges giving instruction in radio communication in connection with their departments of physics or electrical engineering, have set up programs of broadcasting either alone or in cooperation with the State marketing agencies. This work began with the dissemination of weather reports from the Kansas State Agricultural College in 1916. Crop and market reports are now being broadcasted from several universities and colleges. The number of stations broadcasting the weather, crop and market reports is increasing almost daily. For a list of these with call letters see page 16. The additions to this list can be secured by addressing the Radio News Service of the Bureau of Markets and Crop Estimates, Washington, D. C.

The map opposite this page shows the location of the stations now broadcasting. The leased wire connections of the Federal Bureau are also shown. The leased wire service of the Bureau of Markets and Crop Estimates was established in 1916 and during the past six years as many as 17,600 miles of leased wire and 61 branch offices have been in operation. The leased wire has been used to carry reports from the markets, shipment information and reports from shipping points as to supply, demand, and f.o.b. prices. Even in its most extended form, the leased wire with the largest number of branch offices was never able to reach more than a small percentage of the people interested.

The function of the leased wire will not be changed or curtailed by the establishment of the radio method but will be the nucleus of an effective system employing wired telegraph and telephone as well as radio telegraph and telephone, and may be extended.

The Air Mail Radio Service of the Post Office Department was established primarily to give communication between the flying fields, in connection with the transportation of mail by airplanes. These stations have to be available for service a large part of the day but have considerable time which is not necessarily occupied in the business of the air mail service. The market reports are sent out on schedules which are adapted to the unoccupied time at the stations. This incurs merely a nominal additional expense to the Post Office Department and inasmuch as the market information is obtained for other uses by the Federal Bureau of Markets and Crop Estimates, the service as constituted at present incurs practically no additional expense to this Bureau. Because of the necessity of using stations not intended primarily for broadcast transmission but rather for interstation traffic it is not possible to organize as effective and complete a service as could be furnished by a chain of stations equipped solely for radio broadcast transmission. It is thought desirable, however, to take advantage of every facility available in order to obtain experience in handling market news by this method and be ready to install a more effective service should special facilities be made available at a later date.

Forms of Reports.

Certain types of market information can be put into a form for rapid transmission by use of standard forms and code letters. This does not involve the ordinary use of code words and the necessity of coding and decoding the messages received but it does make necessary the sending and receiving of the reports on special forms. Inasmuch as the sender and the receiver use identical forms, it is possible by the use of code letters preceding each blank space in which information is to be copied to transmit rapidly a large amount of information prepared in standardized form. By the use of such special forms and regular transmitting schedules a very effective service can be developed. This field has only been touched upon and great improvements undoubtedly will be developed in the handling of information in this way by both radio telephone and radio telegraph.

The receiving of reports by telegraph codes, using dots and dashes, makes it necessary that receiving operators understand the international (continental) code and be able to copy at least 15 words a minute. Wherever radio telephone communication is established, it is necessary only that the operator be able to adjust the radio receiving equipment properly, since the telephone reports are reproduced in the radio receiving equipment just as they would be in a wall or desk telephone. Wherever it is desired to utilize the reports sent by radio telephone, for publication or further distribution, they can be received and copied by a stenographer. At the present time only a few special forms of reports have been developed for use in radio broadcast communication. Others will be developed from time to time as the service grows and modifications of the present forms undoubtedly will be made.

In the forms of reports already in use, two-letter code symbols are used to designate the information sent. These are used in two different ways: (1) A two-letter symbol is placed at the beginning of the blank space which is to contain a certain type of information. The operator simply sends the two code letters and the information occupying the blank space. For example, in sending "New Jersey sacked Irish Cobbler potatoes per 100 lbs., in consuming markets, New York (SR) $1.75-2.10," the operator would send only "(SR) $1.75-2.10." (2) Code letters are also used to designate certain options or alternatives to indicate types of information. For example, "Demand for Wheat, Milling, Strong (DK)_________, Fair (DL)_________, Poor (IM)_________". The operator would send (DK), (DL) or (IM), as indicating one of the three alternatives and the receiving operator would put a check mark in the blank space following the letters received. Fractions are avoided wherever possible, but when necessary are sent as follows:

$1.50 is sent as IR50
$1.50-1/2 is sent as IR50 and I DN 2.
7/8 of 1 cent is sent as 7 DN 8 cents.
65-7/8 cents is sent as 65 and 7 DN 8 cents.

Cooperation with States.

In a number of States, the State bureaus of markets and State extension departments, are cooperating with the Federal Bureau of Markets and Crop Estimates in organizing the agricultural communities to receive and utilize radio crop and market reports. In some cases they have established information centers which serve as distribution points for sending out the information through various channels. In some cases progressive agricultural counties have installed receiving equipment in connection with farmers' organizations so that the information will be available to the county agent for further extension either through the daily newspapers, telephone exchanges, or other agencies. It is probable that an important application of the radio service will be through organizations or institutions which will install equipment with competent operators to receive the reports and distribute them or make them available to individuals or groups or organizations of producers. Since the radiophone is coming into more general use, many of those engaged in producing or marketing farm products are installing equipment to receive the reports directly as no special trained operator is necessary to operate the equipment.

The State marketing agencies that have either made installations of equipment or arranged for broadcasting are:

New Jersey Bureau of Markets	Trenton, N. J.
The Alabama Markets Division	Montgomery, Ala.
Iowa Agricultural Extension Service, Iowa State College	Ames, Iowa.
Minnesota Division of Markets	St. Paul, Minn.
Missouri State Marketing Bureau	Jefferson City, Mo.
Nebraska Bureau of Markets & Marketing	Lincoln, Nebr.
New York State Division Foods & Markets	Albany, N. Y.
Ohio Division of Markets	Columbus, Ohio.
Pennsylvania Bureau of Markets	Harrisburg, Pa.
Texas Division of Markets and Warehouse Dept.	Austin, Texas.
Texas Bureau of Markets, Dept. of Agric.	Austin, Texas.
Wisconsin Department of Markets	Madison, Wisc.
Massachusetts Division of Markets	Boston, Mass.
Colorado Division of Marketing and College of Agriculture Cooperating	Ft. Collins, Colo.

Arrangements in other States are under consideration.

The Transmitting Station.

Wave Length. There are many technical problems in connection with radio telegraphy and telephony that have to be considered in the dissemination of broadcast reports. The question of wave length and kind of transmission are both very important.

Most people who have become interested in radio have bought short wave receiving sets whether they are amateurs and interested in the technique or are interested only in the entertainment and reports.

For transmission amateurs have been restricted to wave lengths below 200 meters and in all probability they will be restricted to short wave lengths not to exceed 300 meters. Wave lengths for broadcasting public and Department of Agriculture services are located at 360 and 485 meters, wave length respectively. There are 36 stations now broadcasting. (See list on page 16) Some of these stations have licenses only for use of 485 meters while others have also license to use 360 meters for general broadcasting of news and entertainment.

Type of Transmitting Set: The development of advanced types of transmitting equipment using vacuum tubes as sources of oscillations has to a large extent been coincident with the recent rapid development in radio telephone transmission. Arc transmission is quite largely used for radio telegraph transmission and there are also many spark stations in operation. The type of receiving sets used will vary with the type of transmission which it is desired to receive. Crystal detector sets good for short distances only are capable of receiving radio telephone broadcasts and signals from spark transmitting stations. These sets may be of the simplest construction having only a tuning coil, detector and headphones, or may include, leading coils, variable condensers, or be of the loose coupler type. The more sensitive receiving sets employing vacuum tube detectors and amplifyers, if of the regenerative type are capable of receiving the signals from spark, continuous wave arc and continuous wave tube transmission as well as the radio phone broadcasts of voice.

Radio Telegraph and Radio Telephone Transmission.

The subject of radio telegraph (code) and radio telephone transmission has been touched upon above. All things being equal and in readiness, radio telephone transmission is the logical method to use for general broadcasting. It has been quite difficult to purchase reliable, high-powered radio telephone equipment on the commercial market. If the Bureau of Markets and Crop Estimates had waited until the high-powered radio telephone transmitter had become commercially available it would not have made the year and a half of gratifying history which the service now has. After the broadcasting of market news by radio telegraph was shown to be practicable it was decided to use the radio transmitting stations of the Air Mail Service which were already installed and in operation. This formed the first chain of the information-disseminating radio stations without the delay and cost of constructing new ones.

NOTE: Inasmuch as the service is going through a period of rapid development and the number of stations sending the reports is rapidly changing, anyone desiring up-to-date information as to the extent of the service should communicate directly with the Radio News Service, U. S. Bureau of Markets and Crop Estimates, U. S. Department of Agriculture, Washington, D. C.

So rapid has been the progress in the establishment of radio telephone broadcasting services that in very few instances has the Bureau of Markets and Crop Estimates found it necessary to initiate arrangements for the dissemination of its reports. State bureaus of markets, newspapers, private agencies and colleges and universities have requested the privilege of broadcasting official crop and market information. In those states which are not served by the Federal leased wire the agencies doing the broadcasting have arranged to have reports sent to them from the nearest branch offices of the Federal bureau.

These arrangements are rapidly being perfected in many localities so that a market news service will be available to a large proportion of the agricultural states. The radio telephone will undoubtedly become the ultimate type of service adaptable for placing the broadcasts into the hands of people who want the information. Radio telegraph as a method of communication and for primary distribution to points for radio phone broadcasting will probably be found to be more useful than voice transmission. Radio receiving sets of a wave length range from 150 to 3000 meters are capable of receiving radio telegraph signals as well as the radio telephone transmission.

The Radio Receiving Set.

Type of Receiving Set. It is difficult for the non-technical person to choose the best type of receiving equipment for his specific needs. He will find so much radio equipment advertised that his first tendency will be to turn to someone for information. Some Government Bureau is the logical place to inquire for unbiased opinions. The Bureau of Markets and Crop Estimates has asked the Bureau of Standards to furnish the technical information on radio receiving equipment. The Bureau of Standards has been gathering information regarding radio receiving sets which are commercially available and is making certain performance tests on many of them. The information gained in this way will be turned over to the Bureau of Markets and Crop Estimates for general distribution and to assist them in answering inquiries from those who wish to avail themselves of the broadcast news. There will probably be a limited number of types of sets needed to meet the general requirements.

Radio receiving sets are of two general classes: (1) those suitable for receiving signals from sets which transmit damped waves, modulated waves or radio telephone, and (2) those suitable for receiving signals from the above types of sets and also from stations which transmit unmodulated or continuous waves. Damped waves are emitted by spark transmitting sets. The stations broadcasting by radiophone are increasing in number and it may be expected that in a very short time all sections of the country will have services provided. The Air Mail Radio Stations which are continuing to broadcast crop and market information by radio telegraph use continuous wave types of transmitters and send on wave lengths of from 2500 to 4000 meters.

A receiving set of the first class referred to may be a very simple set equipped with a crystal detector. However, such a set is relatively insensitive and can be used for receiving only over short distances. Most receiving sets of the second type referred to use an electron tube detector to which may be connected an amplifier of one or more stages. The crystal detector is suitable for receiving radio telephone signals at points nearby the transmitting station. In certain localities near radiophone sets which are broadcasting the market reports, it may be possible to use the crystal detector sets, but the broadcasting by the Post Office Air Mail Stations is done on the long waves by the use of continuous wave radio transmission. This does not necessarily mean that anyone will have to discard his present sets if he wishes to get the market news. The majority of these sets can be easily adapted to receive messages at the longer waves by such means as the addition of loading coils or by rewinding some of the coils in the sets. High school or college teachers of physics or electrical engineering can frequently give assistance regarding this point and others relating to the receiving equipment.

If one plans in advance, it is not essentially more difficult or expensive to obtain equipment that will receive at the longer wave lengths than at the shorter ones. It is recommended that anyone purchasing equipment for the reception of broadcast radio reports bear in mind the desirability of having equipment that can be modified or adapted to a wide range of wave lengths. In the determination of a consistent policy relating to broadcasting, many matters such as wave length allocation for the different type of services will have to be made. The Radio Conference called under executive order by the Secretary of Commerce on February 27, 1922, brought together a representation of government, state and private interests concerned in the development and use of radio broadcasting. Recommendations from this conference will probably result in laws giving greater regulatory authority to the Department of Commerce.

In purchasing apparatus for the reception of radio market news from a given transmitting station, the wave length range desired to cover, name of and the distance from the transmitting station should be considered.

Cost of Receiving Sets. Any attempt to give the cost of commercial radio receiving sets is attended with difficulties. Some sets may be designed in which dependability is the sole criterion, while others may embody fine appearance with dependability. The showy, unreliable sets are not to be considered here no matter what the cost, for service is of prime importance.

Reliable radio receiving equipment such as is now on the market or which may be especially built for market news reception will probably cost between $75 and $150. These prices cover the range of sets from a simple electron tube detector set to the more complex receiving set complete with detector and three-stage amplifier panels, storage battery, dry batteries, telephone receiver, electron tubes, and possibly some simple antenna equipment. A crystal detector receiving set suitable for receiving radio telephone messages from comparatively nearby transmitting stations are advertised for $10.00 and higher, depending on the accessory equipment included with the set.

The Bureau of Standards expects soon to be in a position to give information on the cost of receiving apparatus and names of manufacturers from which it can be purchased. There is in preparation a list of manufacturers of radio receiving equipment. A partial list of manufacturers of radio receiving equipment has been prepared. This list is now being revised. This list includes manufacturers of built-up receiving sets as well as separate radio parts with which one can assemble a receiving set.

Factors Governing Reception.

The Bureau of Markets and Crop Estimates is undertaking to establish the radio market news service on an efficient basis.

There are many obstacles in the way of making it an immediate, complete success but so far as these have been considered up to the present time, they are not insurmountable and with the cooperation of State and local agencies, the Bureau of Markets and Crop Estimates is rapidly putting the Radio News Service on a practical, substantial basis.

It will be some time before receiving sets are as common as telephones or phonographs, but if the present rate of progress is maintained we can expect to see them in a great many homes and business houses, both in cities and in the country. When broadcasting began the use of radio telegraph necessitated a knowledge of the telegraph codes and the amateurs were the only group interested in receiving the reports. Many of the amateurs made the market reports they received available to farmers and others who wanted the information. Now that radio telephone reception is becoming so general, the limiting factors are the natural conditions, which so far are beyond control, such as weather, atmospherics or electrical disturbances and dust storms. In some localities these will be real obstacles and in some seasons will be worse than others. During the months of June, July and August, radio reception during daylight hours may frequently be interrupted. Some times the interferences will make it impossible to receive at all.

It is not necessary, for our immediate needs, to discuss the probable reasons for these peculiar atmospheric conditions which interfere with radio reception. It is a fact, however, that frequently during the summer months, the atmospherics may completely drown out the radio signals picked up by the receiving set. The idea that higher amplification will relieve the situation is erroneous. The amplifier amplifies the atmospherics along with the incoming signal, so the amplified signal is often less intelligible than the signal received on a simple detector. Signals of great strength from very high power transmitting stations are sometimes audible in spite of the interference. This emphasizes the desirability of using high power transmitting sets, at least under some circumstances.

During storms it sometimes is not only impossible to receive any messages, but it may be unwise, especially if the storm is accompanied by lightning discharges. At such times the antenna should be grounded to protect the apparatus and no attempt made to receive radio messages. Although dust storms are not generally prevalent, they are to be reckoned with. Occasionally the transmitting range of a station will be limited in a certain direction owing to an intercepting dust storm. There are yet other difficulties, such as fading of signals, which will be encountered. However, after taking all of these things into consideration it is probable that a high percentage of completeness may be anticipated in handling this kind of service.

Sources of Information.

References to sources of information on radio for those not already conversant with the subject are given below. This material has been compiled by the Bureau of Standards. It should not be considered complete, for additional sources are continually becoming available and the list is therefore subject to revision at all times. It does, however, point out valuable and necessary information to those who are interested in operating radio stations.

Periodicals. Persons interested in radio communication along the lines mentioned above can keep in touch with radio developments which will be of value to them by arranging to see regularly the issues of one or more of the following periodicals (monthly except as stated) which cover the general and elementary phases of radio communication:

QST - Published by the American Radio Relay League, Hartford, Conn.
Radio News, 235 Fulton Street, New York, N. Y.
Wireless Age, 326 Broadway, New York, N. Y.
Radio Telegrapher, 44 Broad Street, New York, N. Y.
Radio Topics, 4533 North Sawyer Ave., Chicago, Ill.
Radio (formerly Pacific Radio News), 151 Minna St., San Francisco, Calif.
Wireless World and Radio Review (Weekly) 12 Henrietta St., London, England.

The United States Department of Commerce, Bureau of Navigation, issues a monthly periodical called the "Radio Service Bulletin," which will be found of considerable interest by every person engaged in radio communication. This periodical contains information regarding changes in the radio regulations, traffic information, and lists, additions to, or changes in the list of "Commercial and Government Radio Stations," and brief items regarding new developments in radio. Publications of radio interest issued by various Government departments, including the Bureau of Standards, are announced as soon as issued. Subscriptions for the "Radio Service Bulletin" may be placed with the Superintendent of Documents, Government Printing Office, Washington, D. C. The subscription price is 25 cents per year for subscribers in the United States and its possessions, Canada, Cuba and Mexico. For other countries the subscription price is 40 cents per year.

Persons in the vicinity of Chicago will be interested in "Radio Topics" published at 4533 North Sawyer Avenue, Chicago, Ill.

Books. The Superintendent of Documents, Government Printing Office, Washington, D. C., will send without charge, on request, a copy of his "Price List No. 64," which list Government publications of radio interest. The Bureau of Standards issues a list of publications of the Bureau of Standards which are of technical interest; a copy of this list may be secured by addressing the Radio Laboratory, Bureau of Standards, Washington, D. C.

Persons who have had technical training in electricity and radio communication will be interested in the "Proceedings of the Institute of Radio Engineers," 140th Street and Convent Street, New York, N. Y., and the "Radio Review," 12 Henrietta Street, Strand, W. C. 2, London, England. Articles of radio interest frequently appear also in the "Journal of the American Institute of Electrical Engineers," 29 West 39th Street, New York, N. Y.

The Bureau of Standards has prepared an elementary book, "The Principles Underlying Radio Communication," Signal Corps Radio Communication Pamphlet No. 40. This is a book of 600 pages, and more than 300 illustrations, durably bound in fabrikoid. It was prepared primarily as a text book for use in the instruction of Signal Corps men, but has also been used in schools and colleges. It is assumed that the reader has had at least the major part of a high school course, but no knowledge of mathematics beyond algebra is assumed. The first 200 pages are devoted to an introductory general discussion of electricity and electrical machinery, and the rest of the book to the fundamental principles of radio communication. The construction and operation of the important types of radio transmitting and receiving apparatus are discussed. There are numerous circuit diagrams, and useful tables. The operation of electron tube transmitting and receiving sets, including radio telephone sets, is discussed. A copy of the 1922 edition of this book can be purchased for $1.00 from the Superintendent of Documents. This price includes postage in the United States and its possessions, Canada, Cuba, and Mexico. For other countries an extra allowance of 15 cents should be made for postage.

Bureau of Standards Circular No. 120 "Construction and Operation of a Simple Home-Made Radio Receiving Outfit" describes a very simple, crystal detector set which can be made at home. Price 5 cents.

The following are other elementary radio books which will be found useful.

Books Suitable for the Beginner.

E. E. Bucher. Practical Wireless Telegraphy. New York, 1918.
Wireless Press, Inc.

E. E. Bucher. Wireless Experimenters Manual. New York, 1920.
Wireless Press, Inc.

Charles B. Hayward. How to Become a Wireless Operator.
Chicago, 1913, American Technical Society.

Robinson's Manual of Radio Telegraphy and Telephony.
Annapolis, Md., 1920. United States Naval Institute.

The Admiralty Manual of Wireless Telegraphy. London, 1920.
Published by His Majesty's Stationery Office.

M. B. Sleeper, Design Data for Radio Transmitters and Receivers.
New York, 1920, Norman W. Henley Publishing Co.

M. B. Sleeper, Radio Hook-ups. New York, 1920, Norman W. Henley
Publishing Co.

P. E. Edelman, Experimental Wireless Stations, New York, 1920.
Norman W. Henley Publishing Co.

A. C. Lescarboura, Radio For Everybody, New York, 1922.
Scientific American Publishing Company.

A. N. Goldsmith, Radio Telephony, New York, 1918, Wireless Press, Inc.

Laws and Regulations. The laws of the United States require that every radio station used for transmitting signals must have a station license. These licenses are issued by the Bureau of Navigation of the Department of Commerce, Washington, D. C. The United States is divided into nine radio districts. Each district has a Radio Inspector, whose address is given below: (See also Map Opposite)

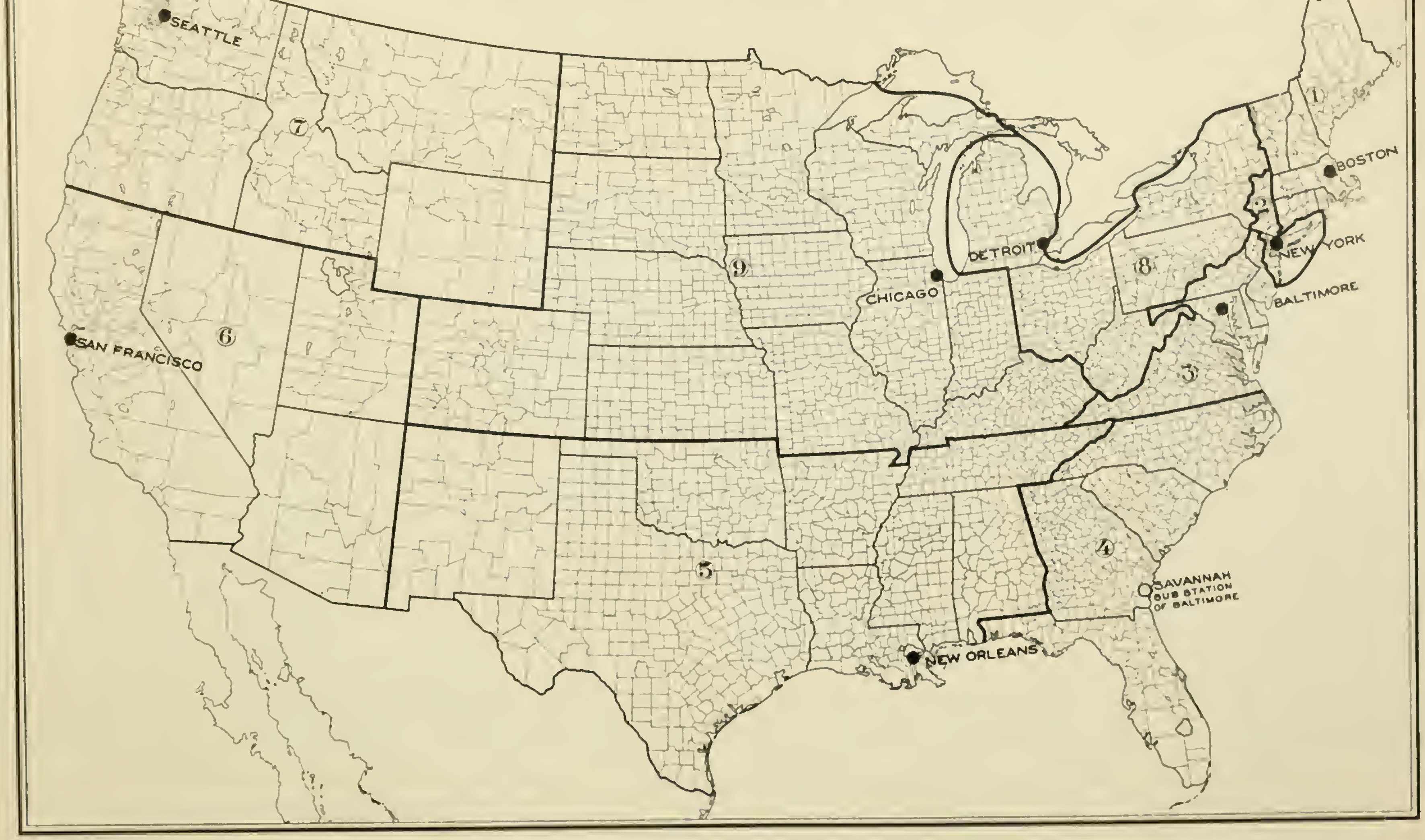
1st	District,	Radio	Inspector,	Customs	House,	Boston, Mass.
2d.	"	"	"	"	"	New York, N.Y.
3d.	"	"	"	"	"	Baltimore, Md.
4th.	"	"	"	"	"	Baltimore, Md.
5th.	"	"	"	"	"	New Orleans, La.
6th.	"	"	"	"	"	San Francisco, Cal.
7th.	"	"	"	2301 L.C. Smith Bldg.,		Seattle, Wash.
8th.	"	"	"	Federal	Bldg.,	Detroit, Mich.
9th.	"	"	"	Federal	Bldg.,	Chicago, Ill.

Requests for application forms for licenses, or for information concerning licenses, should be addressed to the Radio Inspector of the district in which the station is located, or, if this is not known, to the Bureau of Navigation, Department of Commerce, Washington, D. C. A station which is used for receiving only, and does no transmitting, does not require a station license. The operator of a station used for transmitting purposes must have an operator's license, in addition to the license required for the station.

Regulations pertaining to the Radio Broadcasting of Weather, Crop, and Market Information.

1. Forecasts, warnings, and weather reports issued by the Weather Bureau and crop and market reports issued or approved by the Bureau of Markets and Crop Estimates shall be broadcast only from radio stations author-

RADIO INSPECTION DISTRICTS



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ized and licensed to do so by the Bureau of Navigation, Department of Commerce.

2. Broadcasting of weather forecasts and information and crop and market reports shall be confined to radio stations properly equipped for the work and operated by persons holding a commercial second-class or a higher grade of license.

3. No plant will be licensed by the Bureau of Navigation to disseminate weather forecasts and information or crop and market reports, except on the approval of the Chief of the Weather Bureau and of the Chief of the Bureau of Markets and Crop Estimates, respectively.

4. The call letter and location of the station and the official authenticity of the information shall be announced preliminary to each broadcast, and is approximately as follows:

> This is located The weather forecast and reports issued by the U. S. Weather Bureau are as follows:

5. The laws pertaining to the issuance of weather forecasts shall be observed. Violators of the following law will be prosecuted:

> Sec. 61. Whoever shall knowingly issue or publish any counterfeit weather forecast or warning of weather conditions falsely representing such forecast or warning to have been issued or published by the Weather Bureau, United States Signal Service, or other branch of the Government service, shall be fined not more than five hundred dollars, or imprisoned not more than ninety days, or both. (Act of March 4, 1909, C 321, 35 Stat., 1083)

6. All broadcasts shall be according to schedules approved by the Weather Bureau or by the Bureau of Markets and Crop Estimates. No forecasts based on a.m. observations shall be broadcast after 7 p.m. of the same day; no special warnings based on special observations shall be broadcast after midnight of the same day; and no forecasts or warnings based on p.m. observations shall be sent after 7 a.m. of the succeeding day, 75th meridian time applying in all cases.

7. Stations authorized to broadcast official weather forecasts and information and crop and market reports will use a wave-length of 485 meters unless otherwise licensed to do so by the Bureau of Navigation, Department of Commerce. This special wave-length shall be used for no other purpose.

8. License to broadcast weather forecasts and information and crop and market reports shall be revocable at any time that it may be in the public interest to do so.

Every person engaged in any form of radio communication should have a copy of a pamphlet, "Radio Communication Laws of the United States," which can be secured by sending fifteen cents (not in stamps) to the Superintendent of Documents, Government Printing Office, Washington, D. C.

Canadian Radio Laws. The laws regulating the operation of private radio stations in Canada are different in several respects from those in force in the United States. For instance, a station which is used only for receiving must have a station license. For authoritative information, inquiry should be made to the Deputy Minister of the Naval Service, Ottawa, Ontario.

List of Radio Calls. Every owner of a radio receiving set should have a copy each of the pamphlets "Amateur Radio Stations of the United States," and "Commercial and Government Radio Stations of the United States." The price of each of the pamphlets is fifteen cents, and orders should be sent to the Superintendent of Documents. These pamphlets contain lists of the amateur, and commercial and Government stations in the United States, and of the call letters assigned to the stations. A new edition of each pamphlet is published on June 30th of each year. A monthly publication called the "Radio Service Bulletin" is issued which contains information regarding changes in the radio regulations and traffic information and notes, additions to or other changes in the list of "Commercial and Government Radio Stations." Copies of the "Radio Service Bulletin" may be secured from the Superintendent of Documents for five cents per each issue, or subscriptions may be ordered for 25 cents per year.

A "Consolidated Radio Call Book" is published by the Consolidated Radio Call Book Co., 41 Park Row, New York, N. Y. This gives the calls of both United States and foreign stations.

A list of commercial and government stations operating in the United States and in foreign countries is given in the "Year Book of Wireless Telegraphy," mentioned above.

Glossary of Radio Terms.

Antenna.- The antenna is the device used for radiating radio power into space or absorbing radio power from space. In its usual form it consists of a number of wires elevated above the ground and insulated at the end farthest from the radio apparatus.

A Crystal Detector is a device using a mineral which permits current to flow through in one direction only, and serves to make the incoming signals audible in the telephone receiver. In its usual form it consists of a selected piece of a mineral such as galena with which contact is made by the end of a fine wire. The mineral is so mounted that a connection can be conveniently made to it.

Radio Broadcasting is the transmission by radio of messages (either telegraphic or telephonic), music, or other news or entertainment, which is intended to reach an unlimited number of receiving stations and not simply a certain particular station.

The International Telegraph Code is the conventional arrangement of dots and dashes adopted to represent the letters of the alphabet, figures, etc., for the transmission of intelligence by radio telegraphy.

Wave Length.- The length of a wave is the distance between successive crests of those of the same frequency. Receiving and transmitting apparatus must be adjusted or tuned to these wave lengths.

Electron Tube.- An electron tube is a device by means of which the phenomenon of electron emission can be made useful in radio communication. It usually consists of a glass bulb from which the air has been exhausted, and contains three pieces of metal, called filament, grid and plate. The filament has two outside terminals, and is caused to glow by a current supplied to these terminals. The plate and grid have one outside terminal each. The usual type of electron tube greatly resembles in appearance an ordinary incandescent electric lamp bulb. (This has frequently been called various names such as "vacuum tube," "audion," "triode.")

Arc Transmission is the transmission of radio messages by undamped waves generated by an electric arc.

Spark Transmission is the transmission of radio messages by damped waves generated by a spark transmitting set, which usually consists of a spark gap in circuit with a condenser and suitable auxiliary apparatus.

A Tuning Coil is a device by means of which the inductance (and natural wave length) of a circuit can be varied. It usually consists of a coil of wire so arranged that various numbers of turns can be connected in circuit, as by a sliding contact, or by tapped connections.

A Loading Coil is a device for adding inductance to a circuit (or increasing its natural wave length). It usually consists of a coil of wire and may or may not be arranged so that its inductance will be variable.

A Variable Condenser is a device whose electrical capacity can be varied. In its usual form it consists of two sets of metal plates which interleave but do not touch each other; one set of plates can be rotated.

A Coupler is a device by means of which the coupling can be varied in a receiving set having more than one circuit. It usually consists of two coils wound on cylinders, and so arranged that one coil can slide inside the other. (This has frequently been called a "loose coupler," but the word "loose" is superfluous and may be misleading.)

An Amplifier is a device by means of which a signal can be magnified or amplified. The amplifiers which are now of practical importance use electron tubes as essential parts of the apparatus.

A Regenerative Receiving Set is a set using an electron tube as a detector in a circuit so arranged that part of the current flowing in the plate circuit is fed back to the grid circuit, thus greatly increasing the strength of signal delivered to the telephone receivers.

A Continuous Wave is a radio wave in which successive waves over a given interval of time have the same form, and the same amplitude or intensity. For the reception of continuous waves special kinds of receiving apparatus are necessary, and a simple crystal detector receiving set cannot be used.

A Damped Wave is a succession of groups of radio waves, the successive waves in any group decreasing in amplitude. Damped waves can be received with a crystal detector receiving set.

Atmospherics are disturbances caused in a radio receiving set by atmospheric electricity. They cause grinding or crashing sounds in the telephone receiver, and may interfere very seriously with reception. They are more serious in summer than in winter.

The following is a list of the stations now licensed to broadcast Weather, Crop and Market Reports. All of these stations have been granted the use of the 485 meter wave length for this purpose, and 360 meter wave length for broadcasting entertainment.

For complete schedules and for the additions to this list which are being made from time to time address: Radio News Service, Bureau of Markets and Crop Estimates, U. S. Department of Agriculture, Washington, D. C.

Station	Call Letters	Address	Weather	Report, Market	Entertainment
Amer.Radio Research Corp.	W G I	Medford Hillsides, Mass.		X	X
Atlanta Constitution	W G M	Atlanta, Ga.		X	X
Atlanta Journal	W S B	Atlanta, Ga.		X	X
Cino Radio Mfg. Co.	Recom.	Cincinnati, O.		X	
Detroit News	W W J	Detroit, Mich.	X	X	X
Diamond State Fiber Co.	Recom.	Bridgeport, Pa.		X	
Federal Tel.& Teleg.Co.	W G R	Buffalo, NY.	X	X	X
Midland Refining Co.	W A H	Eldorado, Kan.	X	X	
Leo J. Mayberg Co.	K H D	San Francisco, Cal.	X	X	X
Leo J. Mayberg Co.	K Y J	Los Angeles, Cal.	X		X
Marshall Gerkin Co.	W D Z	Toledo, Ohio	X	X	X
Mo. State Marketing Bureau	W O S	Jefferson City, Mo.		X	
University of Minn.	W L B	Minneapolis, Minn.	X	X	X
Metropolitan Utilities	W O U	Omaha, Nebr.		X	X
Midland Refining Co.	W E H	Tulsa, Okla.	X	X	
Nebraska Weslyan Univ.	Recom.	Lincoln, Nebr.	X	X	X
University of Nebr.	"	Lincoln, Nebr.		X	X
Nashville, Tennessee	"	Nashville, Tenn.		X	X
Iowa State College	"	Ames, Iowa	X	X	
University of Ohio	"	Columbus, Ohio		X	
Precision Equipment Co.	W M H	Cincinnati, Ohio	X	X	X
Reichman-Crosby Co.	W K N	Memphis, Tenn.	X	X	X
Reynolds Radio Corp.	K L Z	Denver, Colorado	X	X	X
Richmond Palladium	W O Z	Richmond, Ind.		X	X
Rike Kumler Co.	W F O	Dayton, Ohio	X	X	X
Rochester Times Union	W H Q	Rochester, N.Y.	X	X	X
Southern Radio Corp.	W B T	Charlotte, N.C.	X	X	X
St. Louis University	W E W	St. Louis, Mo.	X	X	

Station	Call Letters	Address	Weather	Report, Market	Entertainment
Texas University	W C M	Austin, Texas		X	X
Union Stock Yards&Transit Co.	W A A F	Chicago, Ill.		X	X
Western Radio Corp.	W O Q	Kansas City, Mo.	X	X	X
Westinghouse Elec.&Mfg.Co.	W D Y	Chicago, Ill.	X	X	X
Westinghouse Elec.&Mfg.Co.	W J Z	Newark, N. J.		X	X
Westinghouse Elec.&Mfg.Co.	K D K A	Pittsburgh, Pa.		X	X
Wisconsin University	W H A	Madison, Wis.	X	X	X
Witchita Board of Trade	Racom.	Witchita, Kansas		X	

The following is a list of the Air Mail Radio Stations sending out Weather, Crop and Market Reports.

Station	Call Letters	Type of Transmission	Meters
Washington, D.C.	W W X	Radio Telephone	1160
		Radio Telegraph Tube C. W.	1980
Omaha, Nebr.	K D E F	Radio Telegraph, Arc Undamped.	2500
North Platte, Nebr.	K D H M	" " " "	4000
Rock Springs, Wyo.	K D H N	" " " "	3000
Elko, Nevada	K D E J	" " " "	3000
Reno, Nevada	K D E K	" " " "	3200

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